COLLEGE OF NATURAL SCIENCES AND MATHEMATICS
THE UNIVERSITY OF TOLEDO

Lake Erie Center

Improving Water Quality for Maumee Bay: Restoring Ecosystems for Health

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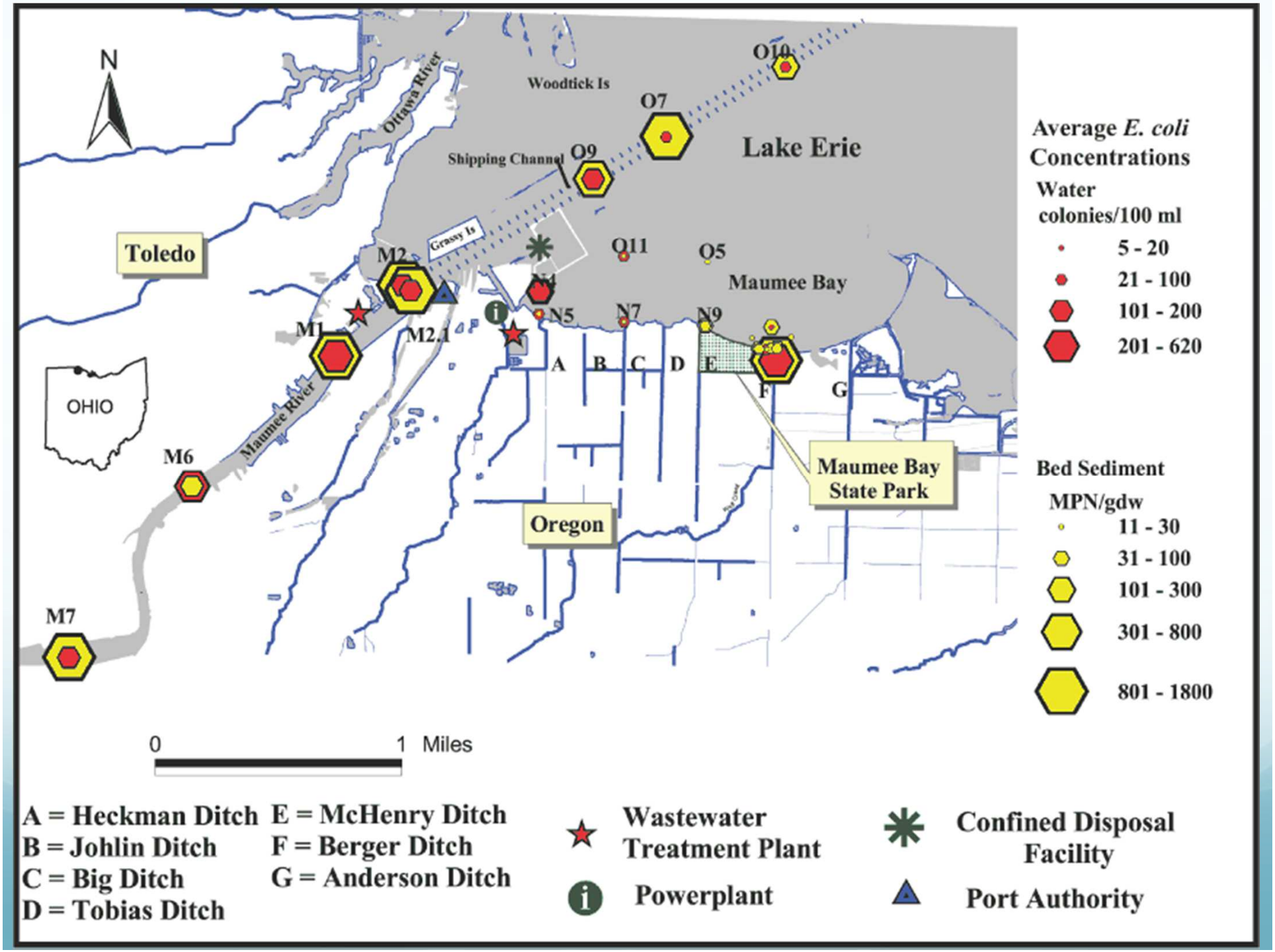
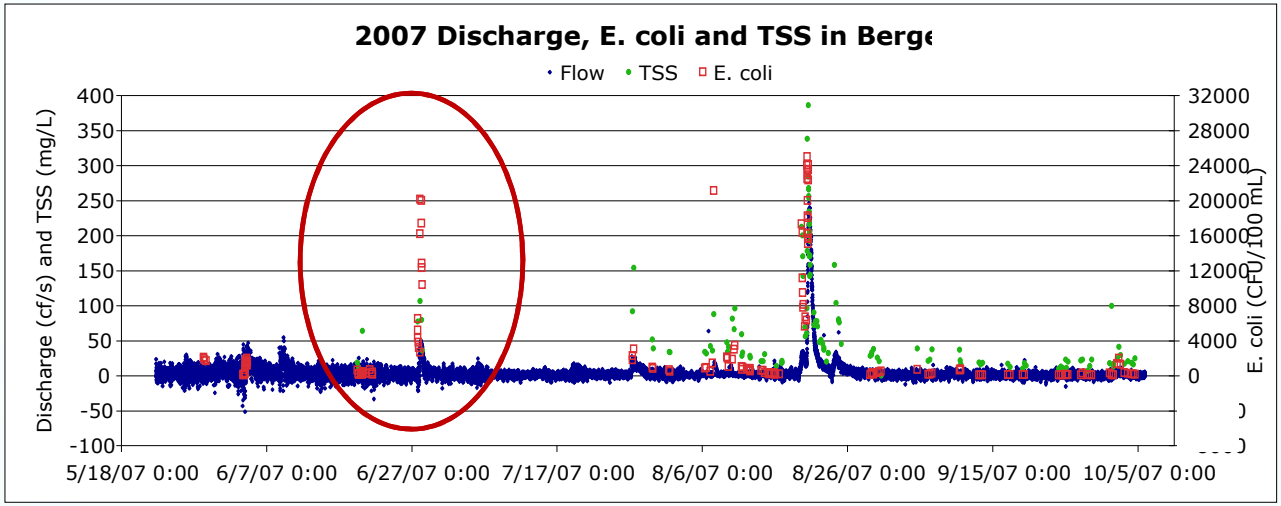
The University of Toledo


N
Ottawa River
Woodtick Is
O10
O7
Lake Erie
Shipping Channel
O9
Grassy Is
Toledo
M2
O11
O5
Maumee Bay
N4
N5
N7
N9
M1
M2.1
A
B
C
D
E
F
G
OHIO
Maumee River
M6
Maumee Bay State Park
Oregon
M7
0
1 Miles
Average E. coli Concentrations
Water
colonies/100 ml
5 - 20
21 - 100
101 - 200
201 - 620
Bed Sediment
MPN/gdw
11 - 30
31 - 100
101 - 300
301 - 800
801 - 1800
A = Heckman Ditch
B = Johlin Ditch
C = Big Ditch
D = Tobias Ditch
E = McHenry Ditch
F = Berger Ditch
G = Anderson Ditch
Wastewater Treatment Plant
Powerplant
Confined Disposal Facility
Port Authority

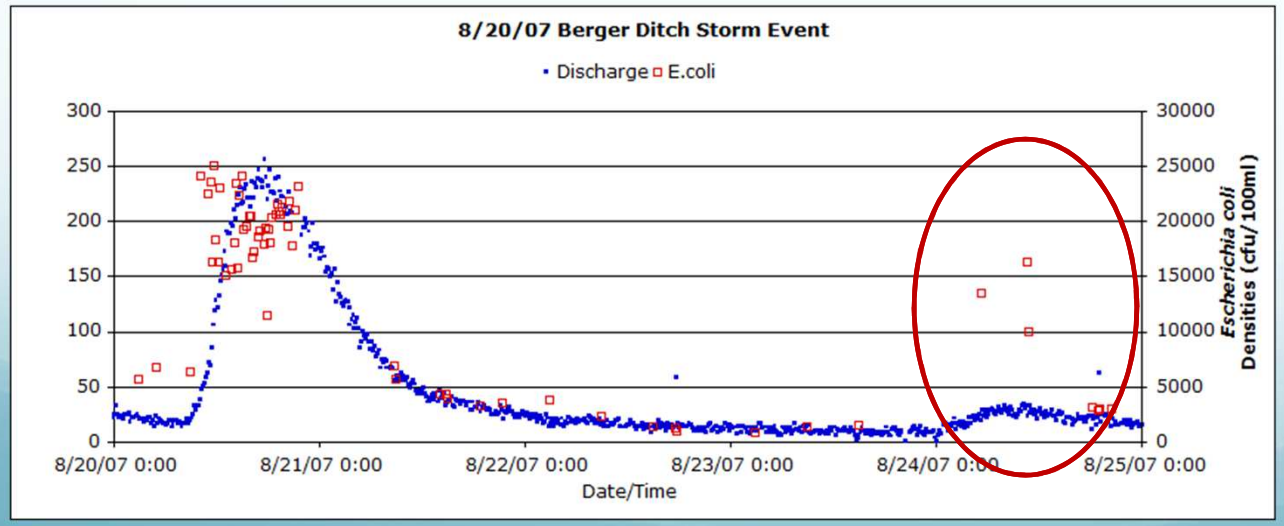
Monitoring Station

Hydro-acoustic Doppler velocity meter & Automatic sampler

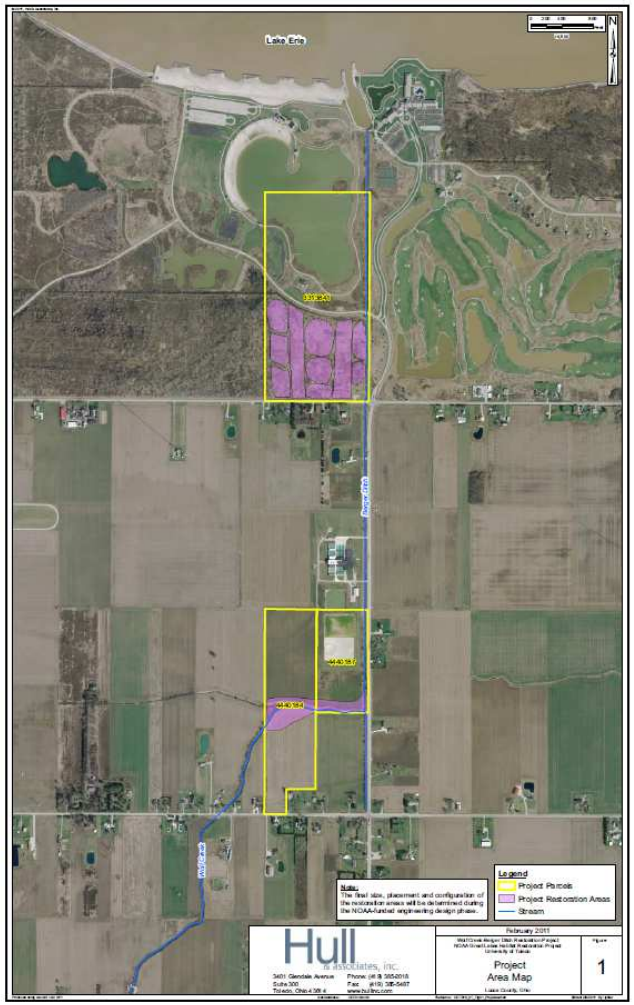
2007 Berger Ditch Time series



Storm Event



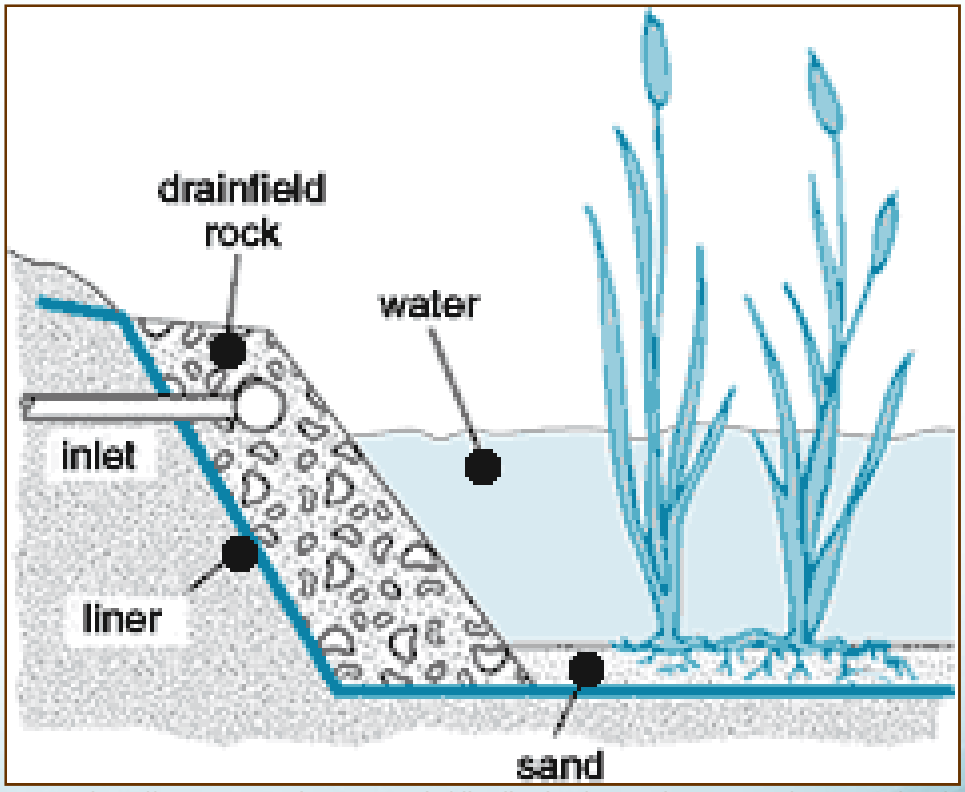
Restoration Sites for Maumee Bay State Park (MBSP)



Aerial view of MBSP and Wolf Creek (dark blue line). The sites for the wetlands within MBSP and the riparian restoration of Wolf Creek are outlined in yellow; the restored area's footprint is pink.

Surface flow wetlands

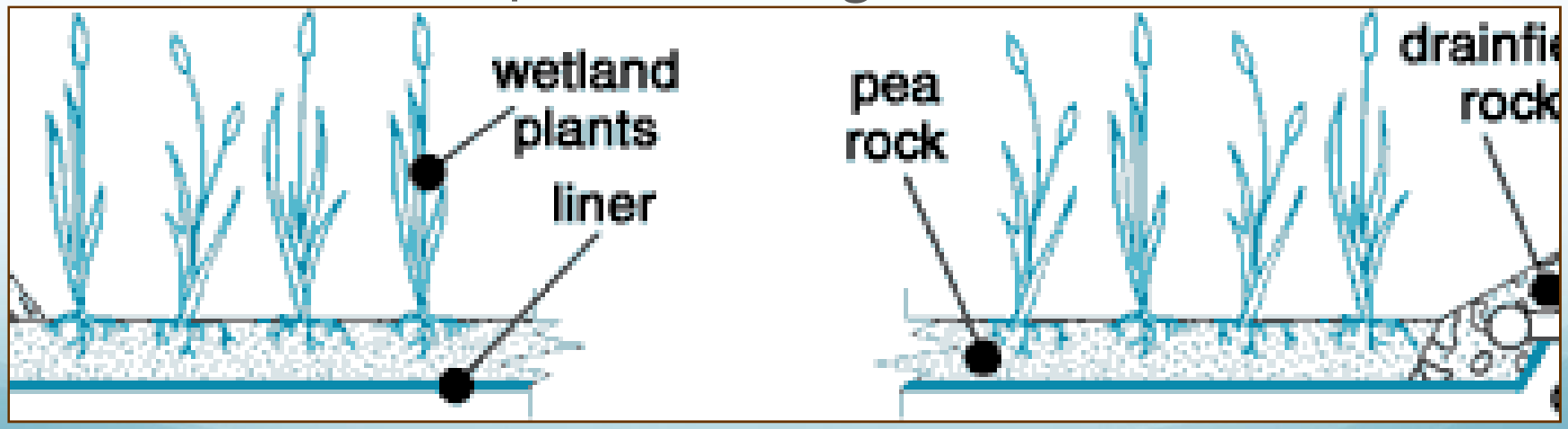
- Also called free-water system (FWS)
- Horizontal flow over soil into system
- Settles out suspended sediment and bacteria



http://www.extension.umn.edu/distribution/naturalresources/DD7671.html

Subsurface flow wetlands

- Horizontal flow into system under the Earth's surface
- Plants rooted in subsurface
- Filters out bacteria and suspended sediment
- Decreases mosquito breeding



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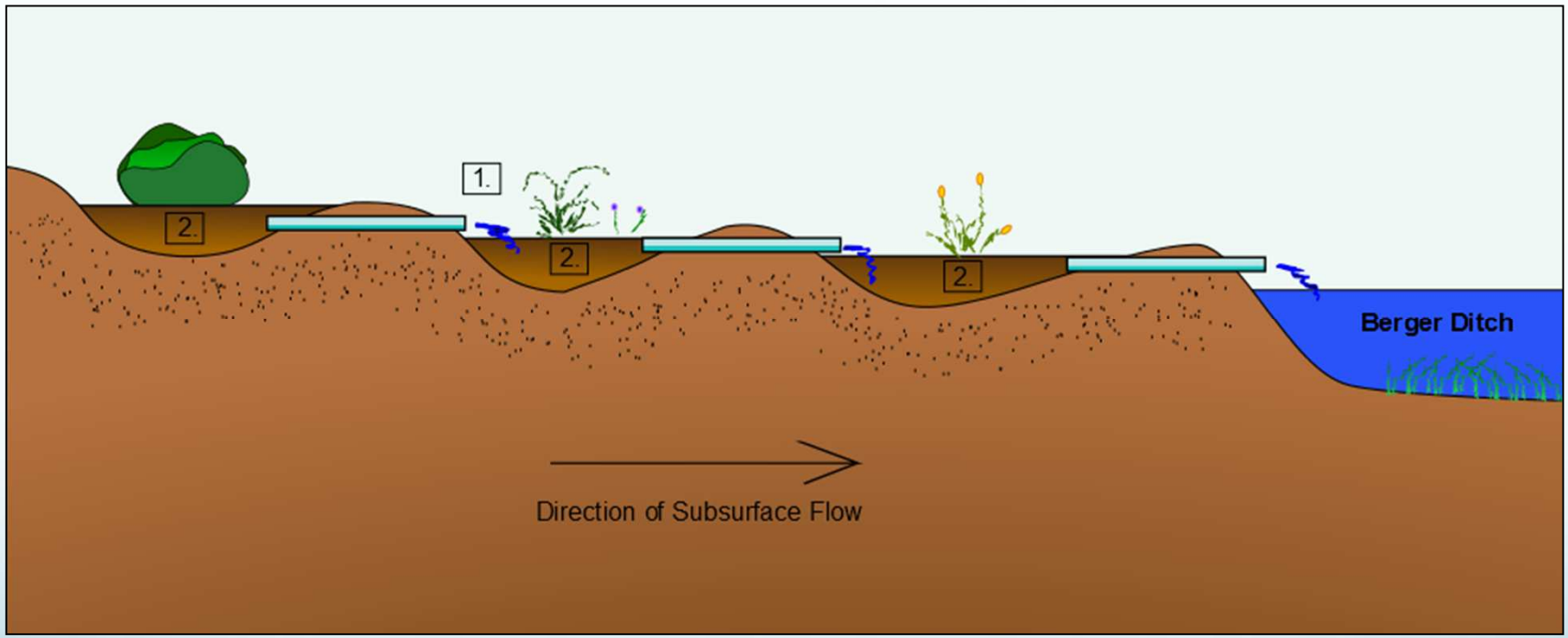
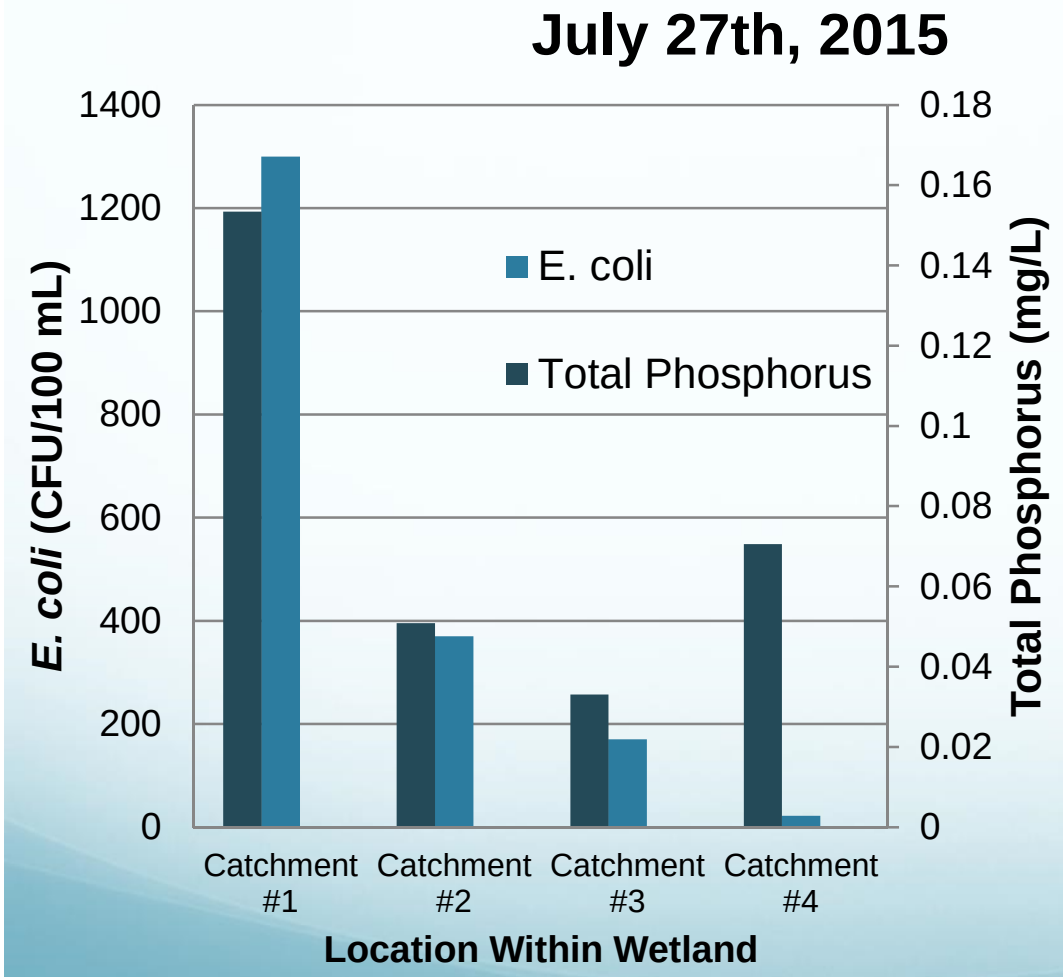
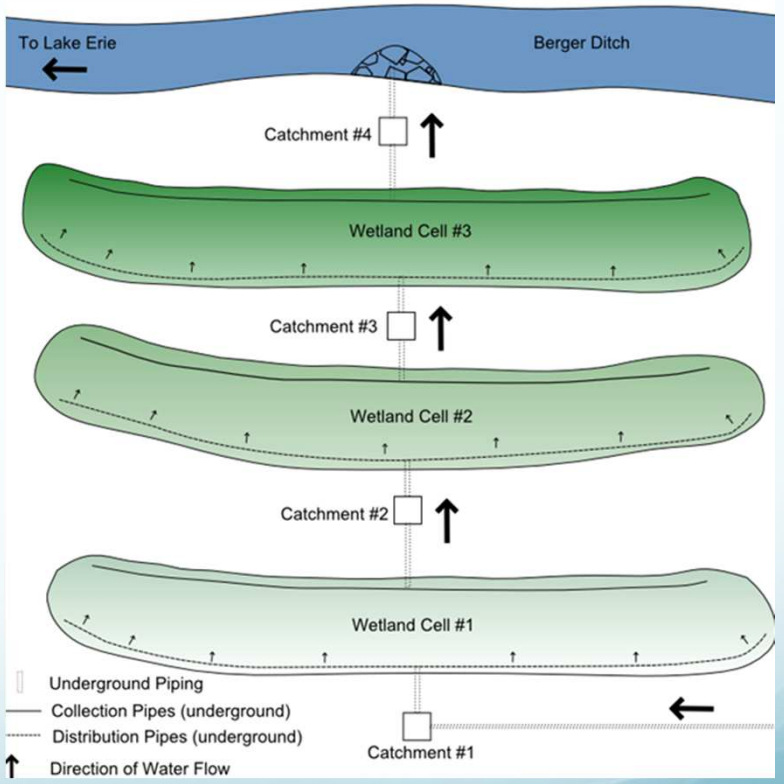
Side View: Constructed Wetland



MBSP Wetlands

Wetland Preliminary Data

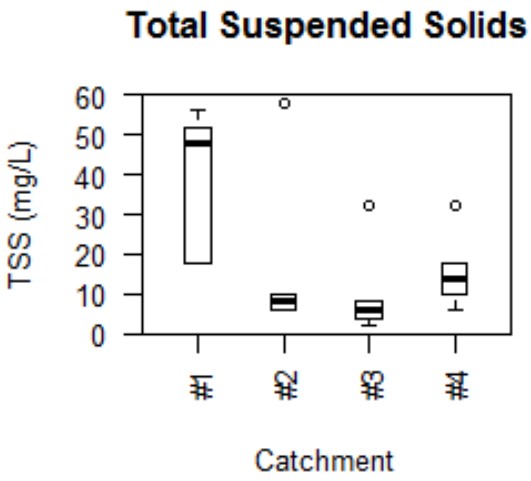


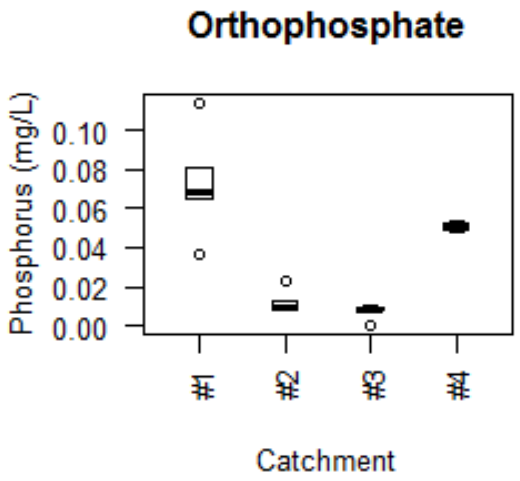


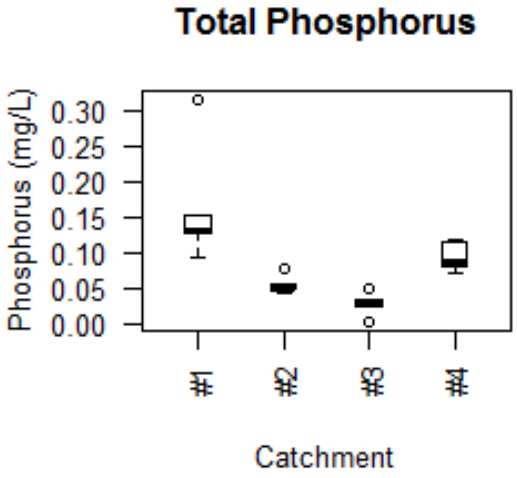
Wetland Preliminary Data

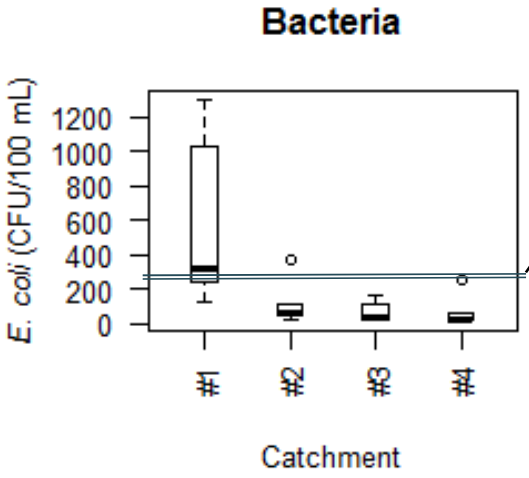
Preliminary results from samples taken in July and August 2015 indicate a reduction of all contaminants as water traverses the wetland (catchment #1 through #4)

Total Reduction (%)	
Turbidity	73.6
E. coli	86.5
TSS	54.8
Total Dissolved Phosphorus	35.4
Total Phosphorus	42.6

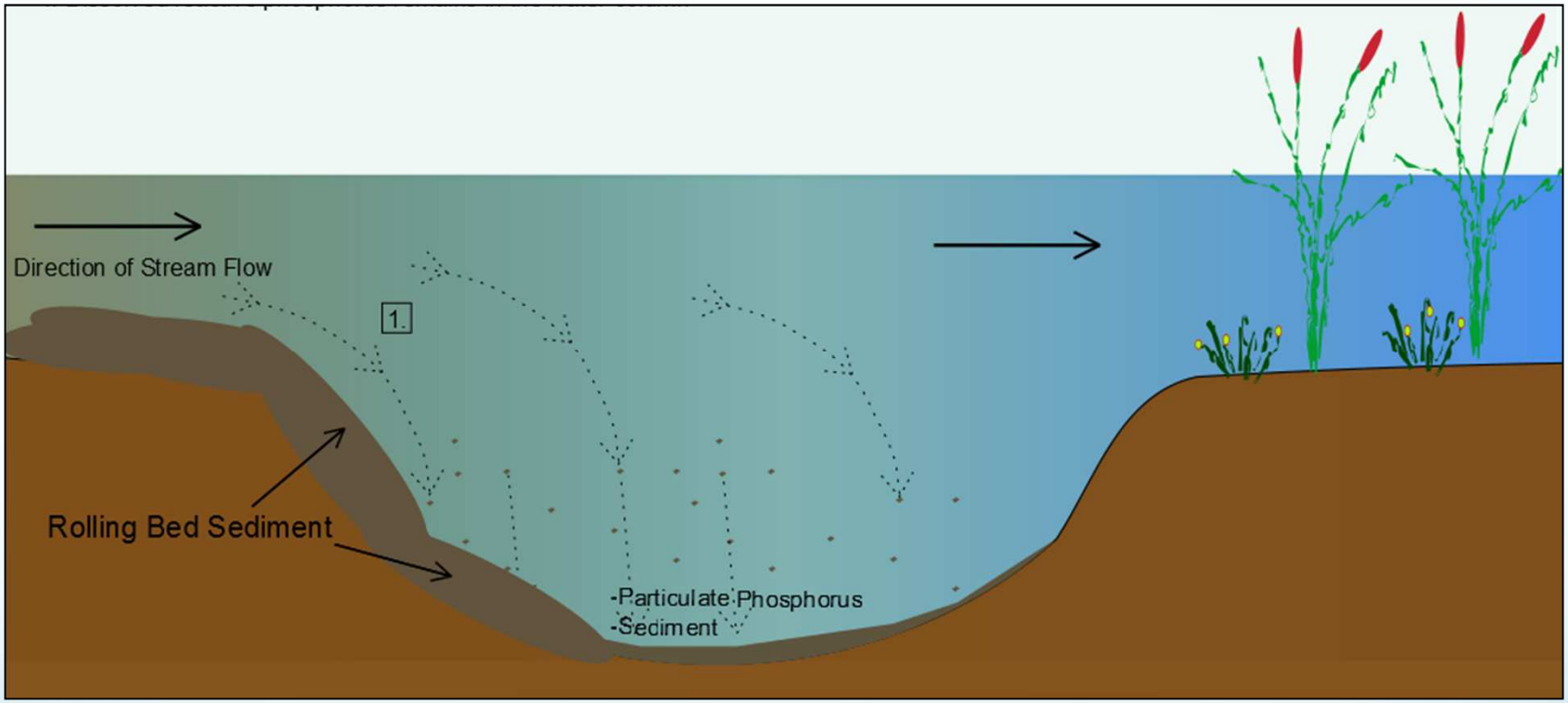




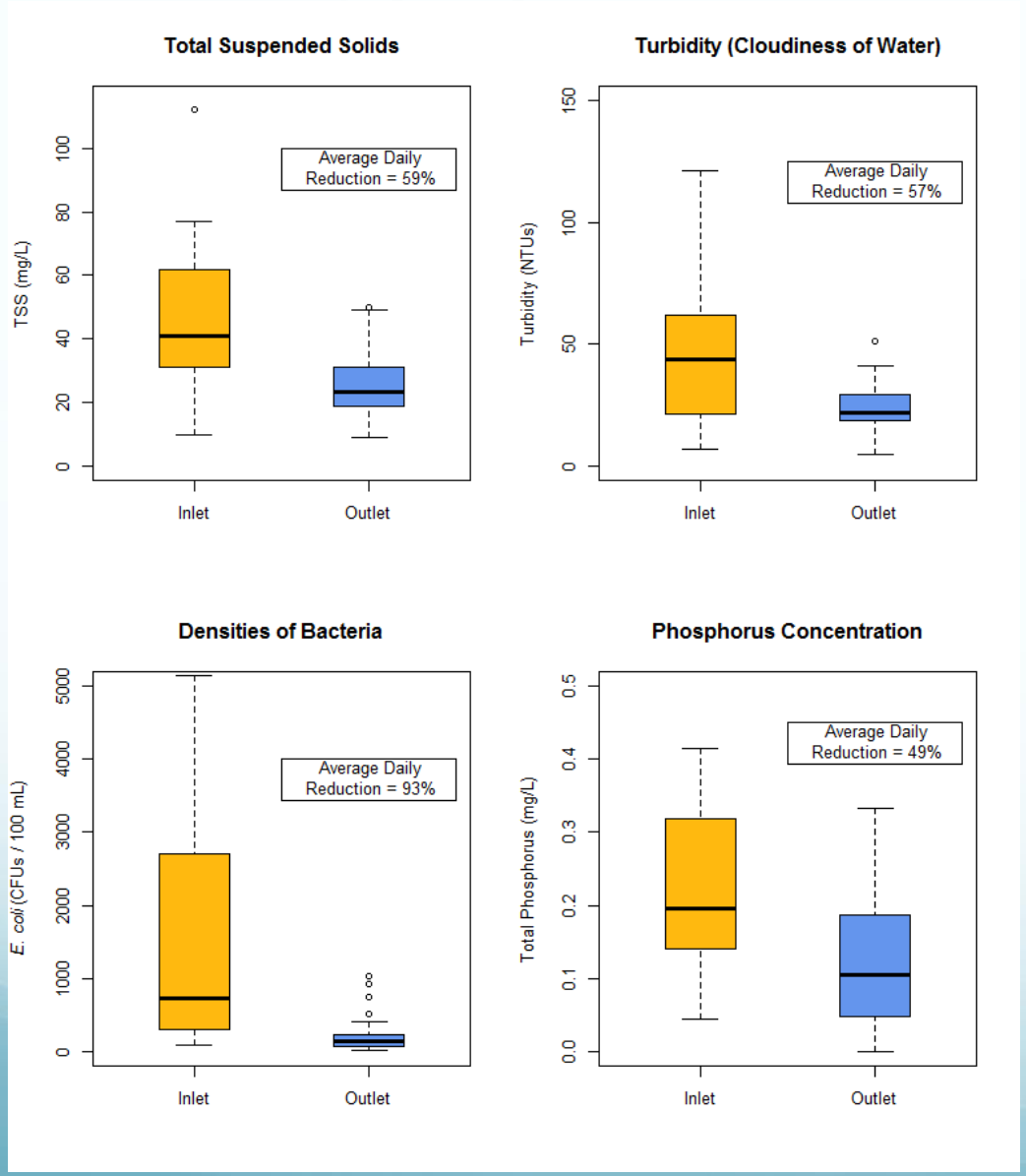




Ohio EPA Primary Contact Threshold: 235 CFUs/100 mL


Direction of Stream Flow
1.
Rolling Bed Sediment
-Particulate Phosphorus
-Sediment

Sedimentation Pond - Preliminary Data



- Water Samples (Left): July 2014 – July 2015
- Sediment Accumulation (Bottom): Nov. 2014 – July 2015
- Over 220 m^3 of Sediment has Accumulated Over the Past Year
- Or, 300 metric tons!!

Sedimentation Pond

Questions?

Reduce Escherichia coli, Phosphorus and Sediments – Funding: GLRI (EPA) + USDA

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